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(54) Support pad with uniform patterned surface.

(57) A resilient pad (10) has a uniform patterned support surface, including a plurality of parallel ribs (18). Each rib (18) has a like profile of stacked compressible steps (23, 25, 27, 29) of varying widths. Progressive collapse of the steps (23, 25, 27, 29) under different loading results in differential resilient support responsive to such loading. Troughs (20) between adjacent ribs (18) have profiles identical to that of the ribs (18) when inverted so that two pads (10) may be simultaneously manufactured in mutually-facing, complementary alignment. The ribs (18) may execute a rocking action when loaded, which reduces the transmission of shear forces to a load such as a hospital patient, while rib compression provides an air pumping action for circulating air about the patient.

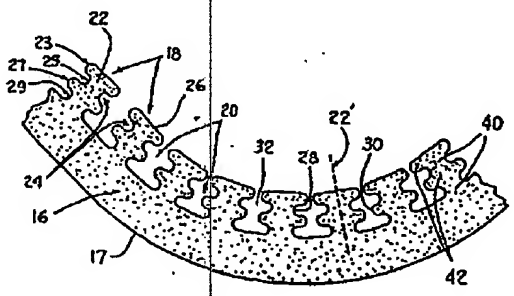

Fig. 2.

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SUPPORT PAD WITH UNIFORM PATTERNED SURFACE

This invention relates to an improved support device and in particular a device such as a mattress pad for providing different degrees of support responsive to variable loading conditions, even with a uniform patterned support surface.

Numerous conventional support devices comprise a pad or the like formed of synthetic foam which elastically deforms to cushion a load received on the pad. For example, rectangular foam pads of uniform thickness have been used as mattress-like cushions for supporting the body of a person. Since some parts of the body (such as the chest or buttocks) are heavier than others, such parts compress the pad more than do the lighter extremities. Uniform thickness pads (having uniform support characteristics) are known for their tendency to exert uneven pressures on different parts of the body, especially resulting in relatively higher pressures on the heavier body portions. It is also generally known that certain levels of pressure exerted on a person's body by a support pad at the areas of contact therebetween, for given periods of time, tend to restrict proper blood circulation to those areas, which could lead to decubitus ulcers (bed sores).

In one typical approach to such problems, convoluted pads with dimpled surfaces are used to support a body. Such pads have numerous peaks which extend from the surface of the pad into contact with the patient to be supported. Each peak of a convoluted pad acts much like a separate cushion, thereby providing more variable support than a uniform rectangular resilient pad. While offering improved variable support over a uniform pad, the convoluted pad, too, may still tend to restrict circulation in the body at the points which are in contact with the peaks, again leading to decubitus ulcers.

Uniform thickness pads with slits cut into their support surface are also part of conventional efforts for providing improved patient support. Such slits in a pad create numerous sections which can act relatively independently to provide variable support. Use of a slitted pad having a flat contact surface may to some extent avoid the concentrations of pressure on a patient found adjacent to the peaks of a convoluted pad. However, variable or differential support adequate to prevent decubitus ulcers may still not be maintained. Also, with relatively narrow slits between adjacent sections, frictional engagement between such sections can interfere with fully independent operation of the sections. Such side-to-side frictional engagement of adjacent sections can also result in the transmission of shear forces to a patient received on such sections.

Furthermore, all of the above-mentioned types of pad may generally tend to preclude adequate or desired ventilation of the underside of a patient which is in contact with the pad. Ventilation is necessary to aid in the healing of any wounds which may be present on the patient, and to generally improve the comfort of the patient by carrying away perspiration, thereby cooling the body.

The prior art contemplates numerous further surface features in efforts to improve patient support, such as holes through a pad or channels formed in a pad. In manufacturing such pads, various complicated cutting steps are often required, demanding skilled manual handling of the pad or sophisticated equipment, and producing a significant amount of waste material, which adds to manufacturing costs. Even greater manufacturing complexity is involved with some prior art pads which attempt to provide improved differential support of a patient by having multiple zones of different support surface features. See, for example, US-A-3,885,257 and GB-A-1,559,851. The added complexity comes about from having to treat, cut, or otherwise process the pad differently to form each of its different support zones.

According to the present invention, there is provided a resilient support pad having a support surface traversed by alternating elongate ribs and troughs, wherein each rib has a root integral with a base portion of the pad and a free support edge in the support surface, and between its root and its free support edge the rib has alternating portions of greater and smaller widths to provide progressive collapse of the rib when increasing loads are exerted thereon. Between their roots and free edges, the ribs may have a side surface, or a pair thereof, of wavy or sinuous form thereby to form the said portions of alternating width. The ribs and troughs can have identical transverse cross-sections, albeit one is inverted with respect to the other.

The description which now follows is given by way of example only.

The present invention recognises and addresses such drawbacks and other aspects of support devices. Accordingly, it is one aim of the present invention to provide a support device such as a pad which provides improved, differential support of a load thereon, but which can be efficiently manufactured with little or no waste material being produced.

Another aim of the present invention is to provide a resilient pad which affords well ventilated support to a user, while still offering a relatively flat or planar support surface for such user.

The present invention also aims to provide a

pad of foamed material which affords variable or differential support to different portions of the body of a patient, responsive to the weight of each such portion, and even while presenting a uniform patterned support surface (i.e., not having different zones with different support surface features or characteristics in each zone).

The invention further aims to provide an efficiently manufactured pad, which permits provision of a differentially-supportive yet uniformly-patterned support surface, while simultaneously producing two of such pads in a mutually-facing, complementary relationship. In other words, such improved pads may be preferably produced two at a time with interlaced, mirror images forming their respective uniformly-patterned support surfaces.

An improved support device according to the invention can minimise the transmission of shear forces to patients received thereon, even if the support device is used over curved or angled mattresses, such as on hospital beds which bend and fold for variously supporting patients. Desirably, the invention affords substantial maintenance of the amount of patient support area while minimizing shear forces with such area.

An improved support device of the present invention can enhance air flow around a patient received thereon, by providing an air pumping action generated by compression of the pad as a patient is initially received thereon or moves and repositions himself thereabout.

While the support device described herein is particularly adapted for use in connection with a mattress in institutional settings, such as in hospitals, it is to be understood that the pads described herein may be used in other settings, such as homes or convalescent centers. Pads according to the invention can be used for other purposes, such as insulating, cushioning, or any other more general packing usages.

Various features may in different combinations form different constructions in accordance with this invention. According to one aspect of the invention, there is provided a mattress pad, comprising: a generally rectangular base of resilient material, such base having a relative longitudinal axis, and a generally planar support surface on one side of such base adapted for resting on a mattress or the like; and a plurality of elongated members formed of resilient material and integrally associated with the base on a second side thereof opposite the one side thereof, such elongated members being situated parallel to one another and generally perpendicular to the base longitudinal axis, with predetermined constant longitudinal spacing between adjacent such members so as to form a uniform support surface with the second side.

In the foregoing construction, preferably each of the elongated members have generally the same predetermined profile; viewed in a cross-sectional plane situated parallel to the base longitudinal axis and normal to the base second side, such profile having at least three distinct regions of different widths, whereby progressive collapse of such members responsive to a load received thereon results in varying resilient support characteristics presented to such load, such that in general relatively greater loads are provided relatively greater resilient support even though said pad has a uniform support surface on the second side thereof with the members all having generally the same predetermined profile and a predetermined constant spacing therebetween.

According to another aspect of the invention, there is provided a resilient supplemental patient support pad, comprising: a rectangular base of resilient material having first and second support surfaces on opposite sides thereof, such base having a relative longitudinal axis; a planar surface defined by the first surface; and a plurality of stepwise progressively collapsible resilient means for providing corresponding step-wise increasing resilient support therewith as respective collapsing action thereof progresses, such plurality of resilient means being integrally formed with the base on the second support surface thereof, and being substantially identical to one another for defining a patient support surface with a uniform repeating pattern thereover; wherein differential patient support is provided over the patient support surface without requiring differential formation of such plurality of resilient means in said patient support surface.

According to still another aspect of the invention, there is provided a resilient pad having a plurality of mutually parallel, upstanding ribs integrally formed with a base for defining a primary patient support surface, with a constant predetermined spacing between adjacent ones of the ribs defining troughs therebetween, wherein each of the ribs has the same predetermined symmetrical cross-section, and each trough has a shape corresponding to the symmetrical cross-section inverted, and further wherein the symmetrical shape defines a plurality of stepped resilient support regions, whereby different portions of the primary support surface may differentially support patients thereon by virtue of step-wise progressive rib compression in order from relatively smaller to relatively larger width regions of such ribs, with the plurality of ribs providing a uniform pattern on the patient support surface.

These and other aspects and features of this invention are more particularly discussed and described in the remainder of the specification. Various modifications and alterations to features, elements, and constructions disclosed herewith may